

A Cross-Sectional Correlation Investigation Between Musculoskeletal Disorders and Mental Health Conditions Among Malaysian Adults

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ABSTRACT

This study examines the correlation between musculoskeletal disorders (MSDs) and mental health conditions among Malaysian adults aged 20 to 58. Using the Nordic Musculoskeletal Questionnaire (NMQ) and the Depression, Anxiety, and Stress Scale (DASS-21), data were collected from 88 participants through random sampling. Results indicated a high prevalence of mild upper limb pain (70.5%) and notable levels of anxiety, with 8.0% of respondents experiencing moderate anxiety and 5.7% experiencing severe anxiety. Pearson's correlation analysis revealed weak to moderate positive relationships between MSD symptoms and mental health indicators, with the strongest correlations found between depression and wrist/hand symptoms ($r = 0.34$), stress and wrist/hand symptoms ($r = 0.31$), and depression and neck symptoms ($r = 0.33$). These findings suggest a significant bidirectional interaction between psychological distress and physical discomfort. The study highlights the importance of integrated interventions that address both ergonomic and mental health factors to mitigate the dual burden of MSDs and psychological disorders in working-age populations.

Keywords: Musculoskeletal disorders, Mental health, Anxiety and depression, Ergonomics, Malaysia adult

1. INTRODUCTION

Mental health issues have become prevalent nowadays, just as physical health concerns have after the pandemic. Individuals without preexisting mental health conditions were at risk of developing new mental health disorders, while those already diagnosed were susceptible to relapse or the emergence of additional disorders [1]. In Malaysia, the government-imposed restrictions aimed at curbing the virus's spread inadvertently contributed to a rise in mental health disorders. It was reported that 45% of study participants experienced stress due to movement control measures [2]. Similarly, another research finding suggested that these restrictions, while necessary for public health, inadvertently exacerbated mental health challenges among the population [3].

Research has also highlighted the disproportionate impact of the pandemic on specific occupational groups. It was found that female Malaysian teachers exhibited a higher susceptibility to depression (43.9%) compared to their male counterparts (40%) [4]. Various factors, including heavy workloads and student-related stressors, contributed to the onset of depression among teachers. Additionally, the manufacturing sector also reported an increase in mental health issues, which were attributed to inadequate employee welfare and excessive workloads. These conditions led to decreased job performance and increased the risk of workplace accidents [5].

Healthcare workers were particularly affected by the mental health consequences of the pandemic. Overburdened with excessive workloads and prolonged exposure to psychological stress, they faced heightened risks of developing mental health disorders [6]. The relentless influx of patients left little room for personal time or relaxation, further exacerbating mental health deterioration. Moreover, the constant risk of infection from COVID-19 patients contributed to heightened anxiety and psychological distress among healthcare professionals [7].

Finally, mental health disorders have been identified as a contributing factor to musculoskeletal disorders. A study examined the correlation between mental health disorders and musculoskeletal conditions among coal miners, revealing that occupational stress and psychological distress significantly contributed to musculoskeletal disorders [8].

Therefore, this study aims to analyse the prevalence of musculoskeletal disorders among Malaysian adults, assess the mental health conditions affecting this population, and explore the correlation between MSD and mental health to provide evidence-based insights that can inform targeted interventions and public health strategies.

2. LITERATURE REVIEW

2.1 Prevalence of Musculoskeletal Pain

Musculoskeletal pain, particularly in the upper limbs (i.e., neck, shoulders, upper back, elbows, and wrists/hands) and lower limbs (i.e., low back, hips/thighs, knees, and ankles/feet), is widespread among adult populations. According to the Nordic Musculoskeletal Questionnaire (NMQ), upper limb pain is more common than lower limb pain, with studies indicating that upper body pain is often exacerbated by work-related factors such as prolonged sitting and repetitive movement [9]. In fact, 70.5% of individuals in the current study reported experiencing mild upper limb pain, with lower limb pain being less prevalent, as indicated by 48.9% of participants reporting mild discomfort in the lower back, hips, and knees.

A systematic review by Guduru, the author highlighted that office workers and those in sedentary professions are particularly prone to musculoskeletal discomfort due to poor ergonomics, prolonged sitting, and limited movement [10]. Upper limb pain, especially in the neck, shoulders, and wrists, is a common result of poor posture and repetitive tasks, such as typing and using a computer mouse. Studies have shown that upper limb pain can lead to significant discomfort, reduced productivity, and decreased quality of life [11].

Lower back pain, although less commonly reported than upper limb pain, remains a major issue for many adults. Research indicates that lower back pain is one of the most prevalent musculoskeletal complaints globally, and it is often associated with sedentary lifestyles and improper ergonomics [12]. In the present study, the lower limb pain reported by 48.9% of participants is consistent with the growing body of evidence that highlights the high prevalence of lower back pain in adults, particularly among individuals who engage in prolonged sitting and lack regular physical activity [12].

2.2 Mental Health and Musculoskeletal Pain

The relationship between mental health and musculoskeletal pain is well-established in the literature. Psychological distress, particularly anxiety and depression, has been linked to the exacerbation of physical pain, including musculoskeletal discomfort. The results from the Depression, Anxiety, and Stress Scale (DASS-21) in the present study indicate that anxiety is more commonly reported than depression, with 5.7% of participants experiencing mild anxiety, and 8.0% suffering from moderate anxiety. These findings are in line with a significant body of research suggesting that anxiety disorders are more prevalent than depression in adult

populations, particularly those experiencing physical discomfort [13]. Anxiety has been found to increase muscle tension, particularly in the neck, shoulders, and back, which can contribute to musculoskeletal pain and exacerbate existing discomfort [14].

Depression, although less prevalent in the current study (with only 4.5% of participants reporting mild depression), has also been shown to be a contributing factor to musculoskeletal pain. Several studies have suggested that individuals with depression experience a heightened sensitivity to pain, which may make them more susceptible to musculoskeletal discomfort [15]. Depression and chronic pain often form a vicious cycle, where pain exacerbates feelings of helplessness and low mood, which, in turn, can increase the perception of pain [16].

Stress, although less reported in the current study (with only 1.1% of participants experiencing mild stress), is another psychological factor that contributes to musculoskeletal pain. Stress is often associated with muscle tension, particularly in the upper body, and has been shown to increase the risk of developing musculoskeletal disorders. Rokach, A. found that individuals with high levels of stress were more likely to report musculoskeletal pain, especially in the neck and shoulders, as a result of muscle stiffness and tension. In the context of office workers, stress often arises from heavy workloads, tight deadlines, and poor work-life balance, which can lead to both physical and psychological health issues [17].

2.3 The Interplay Between Musculoskeletal Pain and Mental Health

The bidirectional relationship between musculoskeletal pain and mental health disorders, particularly anxiety and depression, has been well-documented. Anxiety increases muscle tension, which can exacerbate physical discomfort, particularly in the neck, shoulders, and back [14]. In the present study, a significant correlation between upper limb pain and anxiety was found, suggesting that participants with higher levels of anxiety were more likely to report discomfort in the upper limbs. This correlation is consistent with previous research, which has shown that anxiety-related muscle tension in the upper body can contribute to musculoskeletal pain [18].

Conversely, musculoskeletal pain, particularly chronic pain, can also lead to psychological distress. Individuals experiencing chronic pain often report higher levels of anxiety, depression, and stress, as the persistent nature of the pain can lead to feelings of helplessness and frustration [15]. The vicious cycle between musculoskeletal pain and mental health symptoms is evident in the present study, where participants with upper limb pain also reported higher levels of anxiety. This cycle may be particularly pronounced in individuals with chronic pain, where the physical discomfort further exacerbates mental health issues, and vice versa [16].

2.4 Lifestyle and Occupational Factors

Lifestyle factors, including sedentary behaviour and poor ergonomics, play a significant role in the development of both musculoskeletal pain and mental health issues. In the present study, participants reported higher levels of pain in the upper limbs, which could be attributed to sedentary work involving prolonged periods of sitting and repetitive movements such as typing and mouse use. Research has shown that individuals who engage in sedentary work are at a higher risk of developing musculoskeletal disorders, particularly in the upper body [19]. In addition, the lack of physical activity and poor ergonomics in the workplace can exacerbate musculoskeletal discomfort and contribute to the development of anxiety and stress [10].

Furthermore, occupational stress can also play a significant role in the development of both musculoskeletal pain and mental health issues. The pressure to meet deadlines, the demands of the work environment, and poor work-life balance contribute to both physical strain and

psychological distress [17]. This highlights the importance of addressing both physical and psychological health in the workplace, with a focus on improving ergonomics, encouraging physical activity, and providing mental health support.

Despite the rising prevalence of mental health disorders and musculoskeletal discomfort in the post-pandemic era, there is a lack of integrated research focusing on the specific correlation between these two burdens within the Malaysian adult population. While previous studies in Malaysia have investigated mental health among specific groups like teachers or healthcare workers, they often overlook the physical musculoskeletal implications of such psychological distress. Conversely, ergonomic studies frequently focus on physical posture without accounting for the bidirectional role of anxiety and depression. There is currently no robust empirical evidence that quantifies how psychological variables—specifically depression, anxiety, and stress—linearly correlate with discomfort in specific body regions among general Malaysian adults. This study addresses this gap by using validated instruments (NMQ and DASS-21) to identify these associations, providing a necessary foundation for holistic workplace interventions.

3. METHODOLOGY

This study involved 88 Malaysian adult participants, comprising 49 men and 39 women, aged between 20 and 58 years. Participants were selected using a random sampling method without setting a predefined sample size, in order to ensure diversity and representativeness across the adult population. The inclusion criteria required participants to be Malaysian adults, while those with pre-existing severe musculoskeletal or mental health conditions diagnosed before the study were excluded to avoid confounding factors. Demographic information was collected using a standardized health form provided by the Department of Occupational Safety and Health (DOSH), which gathered relevant data such as gender, age, general health status, medication use, and other background factors (Department of Occupational Safety and Health Malaysia, 2020). Musculoskeletal health conditions were assessed using the Nordic Musculoskeletal Questionnaire (NMQ), a validated instrument widely employed in epidemiological research to detect musculoskeletal symptoms and their distribution across body regions [20]. In parallel, psychological well-being was evaluated using the Depression, Anxiety, and Stress Scale (DASS-21), a recognized and validated tool that offers a quantitative assessment of symptoms related to depression, anxiety, and stress [21]. Data analysis was conducted using statistical software to perform both descriptive and inferential analyses. Pearson's correlation coefficient was employed to investigate the relationship between musculoskeletal disorders, particularly upper and lower limb conditions and mental health [22]. This statistical measure evaluates the strength and direction of a linear relationship between two variables, where values closer to +1 or -1 indicate a perfect correlation, 0 denotes no correlation, and ranges in between are interpreted as follows; 0.7 to 1 or -0.7 to -1 signifies a strong positive or negative correlation; 0.4 to 0.7 or -0.4 to -0.7 indicates a moderate correlation; 0.2 to 0.4 or -0.2 to -0.4 reflects a weak correlation; and 0 to 0.2 or 0 to -0.2 represents a very weak correlation. This method enabled the study to identify significant associations between psychological conditions and the prevalence of musculoskeletal symptoms among the participants.

4. RESULTS

4.1 Musculoskeletal Health Assessment

Figure 1 shows the results of Musculoskeletal Disorder Symptoms Scores from 88 participants in this study. The results from the Nordic Musculoskeletal Questionnaire (NMQ) were categorized into upper limb pain, i.e., neck, shoulders, upper back, elbows and wrists or hands, and lower limb pain, i.e., low back, hips or thighs, knees, and ankle or feet. Among the participants, 62 individuals (70.5%) reported experiencing mild pain in the upper limb region, while 5 participants (5.7%)

reported moderate pain, and 1 participant (1.1%) experienced severe pain. The remaining 20 participants (22.7%) did not report any upper limb pain. Regarding lower limb pain, 43 participants (48.9%) reported experiencing mild pain, whereas 8 participants (9.1%) experienced moderate pain. The remaining 37 participants (42.0%) did not report any pain in the lower limb region. These findings indicate that musculoskeletal discomfort was more prevalent in the upper limbs compared to the lower limbs, with the majority of participants reporting mild pain.

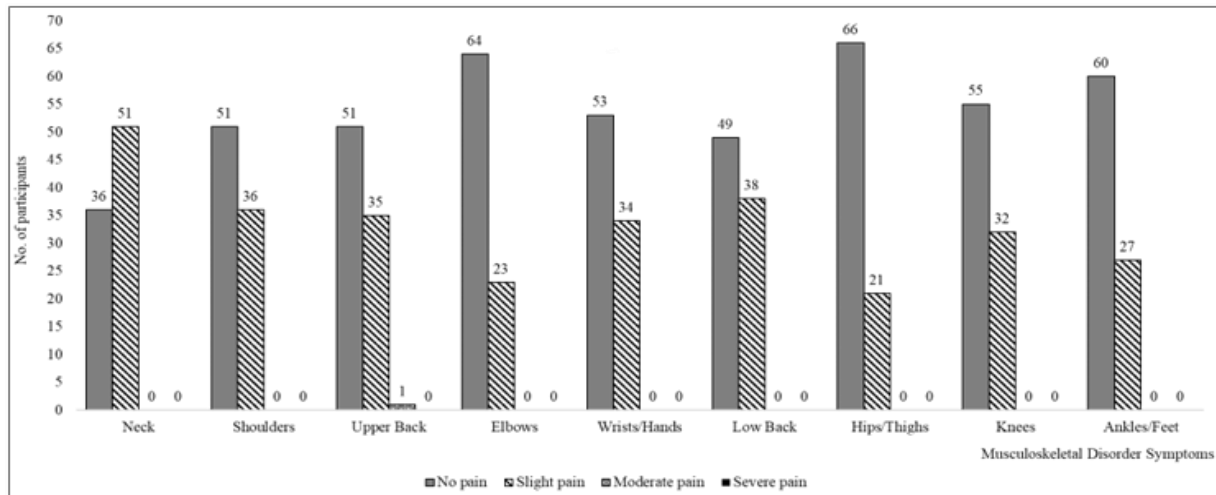


Figure 1. Prevalence and Severity of Musculoskeletal Symptoms across Nine Body Regions (N=88), categorized by the Nordic Musculoskeletal Questionnaire (NMQ) thresholds.

4.2 Mental Health Assessment

Figure 2 presents the results of DASS Scores among 88 participants in this study. The results from the Depression, Anxiety, and Stress Scale (DASS-21) provided insights into the psychological well-being of the participants. In terms of depression, 4 participants (4.5%) exhibited mild depression, while 2 participants (2.3%) reported experiencing moderate depression. Anxiety levels were more pronounced, with 5 participants (5.7%) reporting mild anxiety, 7 participants (8.0%) experiencing moderate anxiety, and 5 participants (5.7%) suffering from severe anxiety. Stress levels were comparatively lower, with only 1 participant (1.1%) experiencing mild stress and another 1 participant (1.1%) experiencing moderate stress. The majority of respondents (97.7%) fell within the normal threshold for stress. Overall, the results suggest a significant prevalence of musculoskeletal pain and psychological distress among participants. The findings highlight that upper limb musculoskeletal pain and anxiety symptoms were more commonly reported than other conditions. These results underscore the need for further investigation into the relationship between occupational and lifestyle factors, mental health, and musculoskeletal disorders.

4.3 Statistical Correlation Between DASS and Upper Limb Disorder

Table 1 and Figure 3 show the Pearson Correlation (r) analysis results from NMQ and DASS-21. The NMQ consists of the upper limb extremities, i.e., neck, shoulders, upper back, elbows, and wrists or hands, and lower limb extremities, i.e. low back, hips or thighs, knees, and ankle or feet, while the DASS-21 focuses on depression, anxiety, and stress elements.

The analysis of the relationship between mental health variables, namely depression, anxiety, and stress, and musculoskeletal symptoms in the upper limb extremities i.e., neck, shoulders, upper back, elbows, and wrists/hands, revealed generally weak to moderate positive correlations. The strongest association within this group was identified between depression and wrist or hand symptoms ($r = 0.34$), followed by stress and wrist or hand symptoms ($r = 0.31$), and anxiety and wrist or hand symptoms ($r = 0.29$). These findings suggest a notable, albeit moderate, relationship

between psychological distress and musculoskeletal discomfort in the wrist or hand region. Neck symptoms were moderately correlated with depression ($r = 0.33$), while anxiety ($r = 0.26$) and stress ($r = 0.27$) showed weaker associations. For the upper back, the correlation coefficients ranged from $r = 0.24$ (anxiety and stress) to $r = 0.27$ (depression), indicating uniformly weak relationships. Musculoskeletal symptoms in the shoulders were weakly correlated with all three psychological variables which depression ($r = 0.21$), anxiety ($r = 0.22$), and stress ($r = 0.20$). Elbow symptoms demonstrated the weakest associations in the upper limb category, with the correlation between stress and elbow pain being particularly low ($r = 0.06$), suggesting a negligible relationship.

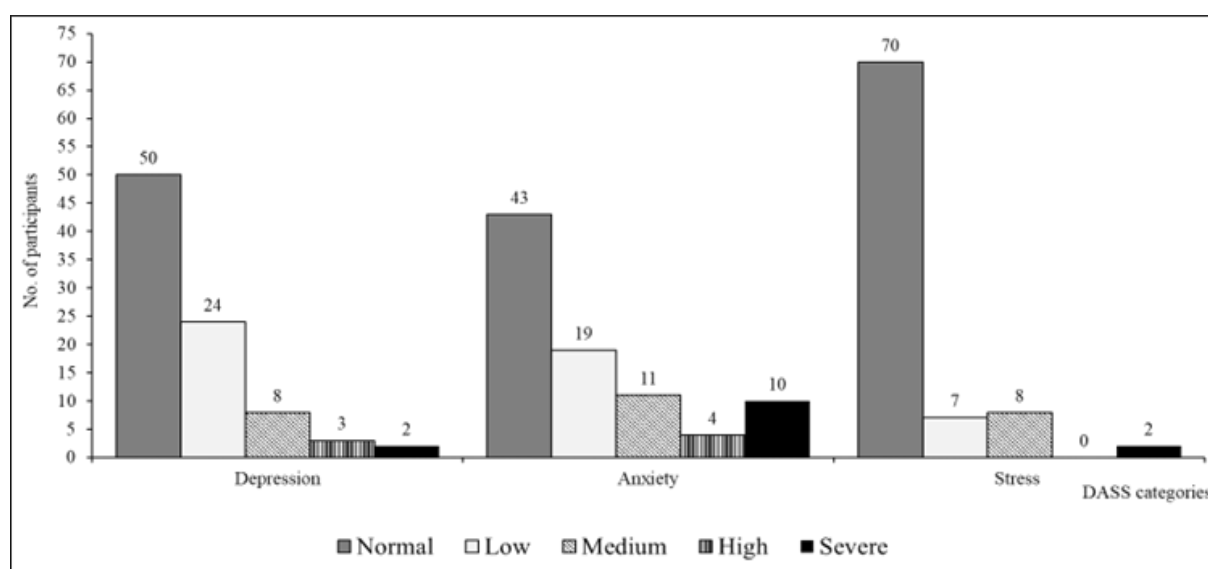


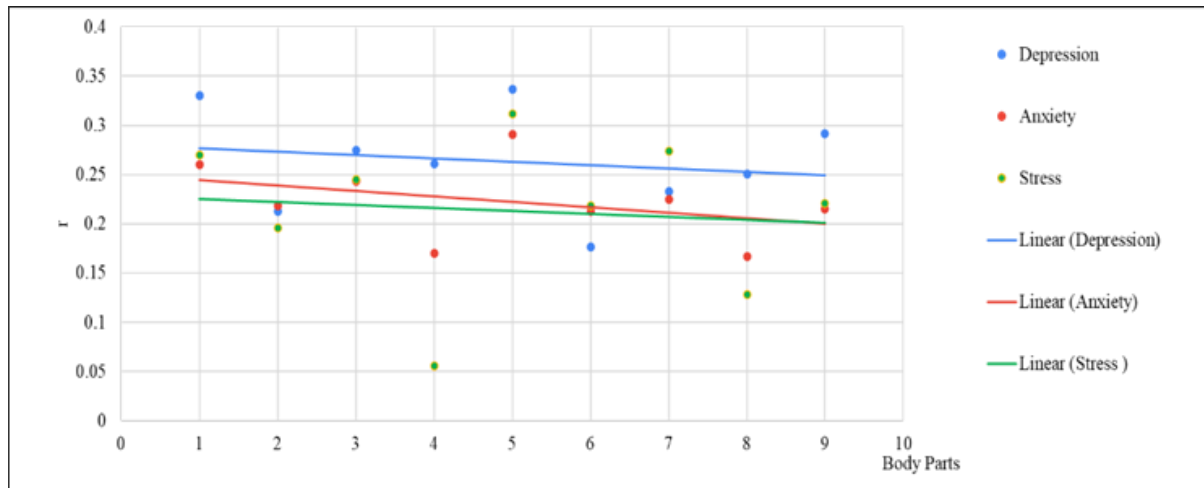
Figure 2. Distribution of Psychological Distress Levels (Depression, Anxiety, and Stress) among Malaysian Adults as measured by DASS-21.

The analysis of musculoskeletal symptoms in the lower limb regions, specifically the low back, hips or thighs, knees, and ankles or feet also yielded weak correlations with mental health variables. Hips or thighs pain showed the highest correlation with stress ($r = 0.27$), followed by depression ($r = 0.23$) and anxiety ($r = 0.22$), suggesting a weak positive association. Similar patterns were observed in the ankle or foot region, where depression ($r = 0.29$), stress ($r = 0.22$), and anxiety ($r = 0.21$) demonstrated weak but consistent relationships with reported discomfort. In contrast, knee pain exhibited the lowest correlation values among the lower limb regions, with stress ($r = 0.13$), anxiety ($r = 0.17$), and depression ($r = 0.25$) indicating minimal associations. Low back pain correlations were similarly weak across all variables: depression ($r = 0.18$), anxiety ($r = 0.21$), and stress ($r = 0.22$).

Across all musculoskeletal regions, the strongest correlation was observed between depression and wrist or hand symptoms ($r = 0.34$), indicating a weak to moderate positive linear relationship. This was followed by stress and wrist or hand symptoms ($r = 0.31$) and depression and neck symptoms ($r = 0.33$), suggesting that psychological factors may play a more pronounced role in musculoskeletal discomfort in specific upper limb areas. Conversely, the weakest correlation was found between stress and elbow symptoms ($r = 0.06$), indicating a virtually absent linear relationship. These findings underscore the variability in the strength of associations across body regions and highlight that while certain musculoskeletal symptoms may be modestly influenced by mental health status, others appear largely independent.

Table 1. Result of Pearson Correlation (r) Between MSD scores and DASS Scores

	Neck	Shoulders	Upper Back	Elbows	Wrists/Hands	Low Back	Hips/Thighs	Knees	Ankles/Feet
Depression	0.33	0.21	0.27	0.26	0.34	0.18	0.23	0.25	0.29
Anxiety	0.26	0.22	0.24	0.17	0.29	0.21	0.22	0.17	0.21
Stress	0.27	0.20	0.24	0.06	0.31	0.22	0.27	0.13	0.22

**Figure 3.** Scatter Graph of Pearson Correlation (r) Between MSD scores and DASS Scores.

5. DISCUSSION

The results from the Nordic Musculoskeletal Questionnaire (NMQ) indicate a high prevalence of musculoskeletal discomfort among Malaysian adults aged 20 to 58, particularly in the upper limbs. Approximately 70.5% of participants reported experiencing mild pain in areas such as the neck, shoulders, upper back, elbows, and wrists/hands. A smaller percentage, 5.7%, reported moderate pain, and 1.1% experienced severe pain. This aligns with the findings of previous studies, which have shown that musculoskeletal disorders, especially in the upper body, are common in populations engaged in sedentary work or repetitive tasks [11]. Lower limb pain, including discomfort in the low back, hips, thighs, knees, and ankles, was less frequently reported, with 48.9% of participants experiencing mild pain and 9.1% experiencing moderate pain. Lower back pain, however, remains a prevalent issue, often linked to sedentary behaviour and poor posture [12]. These findings highlight the widespread nature of musculoskeletal discomfort in this population, with a greater focus on the upper limbs compared to the lower limbs.

The findings related to mental health offer further insight into the challenges faced by this group. The Depression, Anxiety, and Stress Scale (DASS-21) results revealed that 4.5% of participants exhibited mild depression, and 2.3% reported moderate depression. Although the depression levels were relatively low, anxiety was notably more pronounced, with 5.7% reporting mild anxiety, 8.0% experiencing moderate anxiety, and 5.7% suffering from severe anxiety. These results are consistent with the broader literature, which suggests that anxiety is more commonly reported than depression in adult populations [13]. Conversely, stress levels were lower, with the majority of participants (97.7%) falling within the normal threshold for stress. Only 1.1% of participants reported mild stress, and another 1.1% experienced moderate stress. These findings suggest that although anxiety and stress are commonly reported, the overall levels of stress in this population were relatively low, in contrast to the more pervasive issue of anxiety.

The combined analysis of musculoskeletal pain and mental health symptoms reveals notable interrelationships, particularly between upper limb pain and anxiety. A significant Pearson correlation was observed between upper limb pain, especially in areas such as the neck,

shoulders, and wrists, and anxiety levels. This suggests that individuals experiencing higher levels of anxiety may also be more likely to report physical discomfort in these areas. Anxiety is known to manifest in the form of muscle tension, particularly in the upper body, which may contribute to or exacerbate musculoskeletal pain [14]. The results from the NMQ further support this, as a large portion of participants reported mild discomfort in the upper limbs, areas that are commonly affected by stress and anxiety.

The interaction between musculoskeletal discomfort and mental health symptoms, particularly anxiety, appears to form a vicious cycle. Anxiety, by increasing muscle tension, particularly in the neck and shoulders, can lead to discomfort and pain in the upper limbs. This, in turn, can exacerbate feelings of anxiety and stress, creating a feedback loop. Previous research has demonstrated that individuals with chronic pain often report higher levels of anxiety and depression, suggesting a bidirectional relationship between pain and mental health conditions [15]. In this context, the mild upper limb pain reported by many participants could be both a result of and a contributor to mental health issues like anxiety.

The high prevalence of mild upper limb pain among participants may also reflect broader lifestyle and occupational factors. Many modern work environments, especially office-based jobs, involve prolonged periods of sitting and the repetitive use of computers or smartphones. These factors are well-documented contributors to musculoskeletal discomfort, particularly in the upper body [8,19]. The correlation between anxiety and upper limb pain may be exacerbated by the physical strain caused by poor ergonomic practices, lack of movement, and the mental strain of workplace stressors. Studies have indicated that sedentary work environments, coupled with poor posture, significantly contribute to both musculoskeletal disorders and psychological distress [10]. In this context, anxiety may not only manifest as psychological distress but also as physical symptoms, such as muscle tension and pain.

The findings of this study underscore the importance of addressing both mental health and musculoskeletal disorders in a holistic manner. The relationship between anxiety and upper limb pain suggests that interventions targeting both areas are necessary to improve overall well-being. Workplace wellness programs that focus on improving ergonomics and reducing physical strain could help alleviate upper limb discomfort, while mental health support, such as anxiety management and relaxation techniques, could help reduce both physical and psychological symptoms. Moreover, regular physical activity, mindfulness practices, and stress management interventions could be effective in breaking the cycle between musculoskeletal pain and mental health issues.

Therefore, this study reveals a complex relationship between musculoskeletal pain and mental health symptoms in Malaysian adults aged 20 to 58. The high prevalence of upper limb pain and anxiety suggests that these issues are interrelated, with physical discomfort likely contributing to and exacerbating psychological distress. Further research is needed to explore the impact of occupational and lifestyle factors on these conditions, to develop effective interventions that address both physical and psychological well-being. Understanding the biopsychosocial model of pain, which links psychological factors with physical symptoms, will be crucial for improving the quality of life for this population [16].

6. CONCLUSION

In conclusion, this study investigated the relationship between musculoskeletal disorders (MSDs) and mental health conditions among Malaysian adults aged 20 to 58. The findings revealed a high prevalence of musculoskeletal discomfort, particularly in the upper limbs, with 70.5% of participants reporting mild upper limb pain. In parallel, psychological assessments indicated that 8.0% of respondents experienced moderate anxiety, 5.7% severe anxiety, and 4.5% mild depression. The statistical analysis using Pearson's correlation coefficient demonstrated weak to

moderate positive correlations between MSD symptoms and mental health indicators, with the strongest correlation observed between depression and wrist/hand symptoms ($r = 0.34$), followed by stress and wrist/hand symptoms ($r = 0.31$), and depression and neck symptoms ($r = 0.33$). These results suggest that psychological distress, particularly anxiety and depression, may contribute to increased musculoskeletal discomfort, especially in regions prone to tension such as the neck and upper limbs. The observed interplay points to a bidirectional relationship in which physical pain may exacerbate psychological distress and vice versa, potentially creating a feedback loop. For example, muscle tension associated with anxiety may lead to upper limb pain, while persistent discomfort can intensify anxiety symptoms. Such findings reinforce the need for integrated health approaches that address both physical ergonomics and mental well-being, especially in sedentary and high-stress occupational settings. Future research should employ longitudinal methods to explore causal pathways and include larger, more diverse populations. Furthermore, workplace interventions that improve ergonomic conditions, promote physical activity, and offer mental health support may prove effective in reducing both MSDs and psychological strain among adults.

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